

INVISIBLE HINGE

This invention relates to Improvements in an Invisible Hinge.

The invisible hinge has been widely used throughout the world for many years. A basic design is illustrated in U.S. Pat. No. 1,984,092, issued Dec. 11, 1934 to Joseph Soss.

It is an object of the present invention to improve the basic design by providing structural elements which improve the load-carrying characteristics while also improving the action of the hinge.

It is a further object of the invention to improve the design without basic changes in the dimensions or dies which are already existing and available in standard practice. Thus, the mechanical or architectural specifications and standards which have been longstanding in the industry need not be changed to accommodate the new design.

The invisible hinge construction has long used a plurality of laminate links connecting the portions of the hinge which are recessed in the abutting surfaces (when closed) of the jamb and door edge. The present invention contemplates providing split laminate sections formed of a durable dense plastic having bearing and wear characteristics, these being placed on the opposite sides of individual laminate stacks to maintain the dimensions of each stack while improving its wear characteristics and reducing the need for lubrication and improving the "action" of the hinge. In addition, bearing sleeves are provided in contact with the outside laminates and around the transfixing slide pins to increase the friction-reducing surfaces and further improve the action without reducing the resistance to cantilever load.

Other objects and features of the invention relating to the principles of operation and details of construction will be apparent in the following description and claims wherein is set forth the best mode presently contemplated for the practice of the invention.

DRAWINGS accompany the disclosure and the various views thereof may be described as:

FIG. 1, a view of the inside of a hinge in closed position;

FIG. 2, a view of the outside or back of the hinge in closed position;

FIG. 3, an end view of the closed hinge;

FIG. 4, an inside view of the hinge in open position;

FIG. 5, a sectional view of the hinge taken on line 5—5 of FIG. 1; and

FIG. 6, a sectional view of the hinge in open position.

Referring to the drawings, in FIG. 1 the face of the hinge is shown in the closed position having right and left block body portions 10 and 12. These portions are completely recessed into a door jamb and the edge of a door respectively so that the hinge is invisible from the outside when the door is closed. The rear face of the hinge is shown in FIG. 2. The body portions 10 and 12 have extensions 14-16 and 18-20 respectively, which are provided with screw holes 22 to secure the hinges in the recessed parts. An end view of the hinge is shown in FIG. 3.

The blocks or body portions 10 and 12 are each provided with facing recesses which receive sets of laminated plates to provide the hinging function. These plates are interdigitally arranged so that one end of each is pivoted on a first pivot pin located adjacent the

inner face of the hinge blocks. With reference to the drawings, these first pivot pins are shown in section in FIG. 6. Two sets of plates designated generally at 30 and 32 are pivoted at one end on the pin 34 which is introduced through a hole 36. The other sets of plates 40 and 42 are pivoted on block 12 by a pin 44 introduced through hole 46. The other ends of these sets of plates are transfixed by a slide pin shown respectively at 48 and 50 and intermediate portions of the plate sets are transfixed by a riveted pin 52 centrally of the assembly. Sectional views 5 and 6 show the parts in closed and open positions.

The die cast blocks 10 and 12 are provided with slide recesses 60 and 62 respectively open to the inner face which receive the ends of the slide plate sets which are transfixed by the pins 50 and 48. Intermediate the top and bottom of these recesses is a stationary slide bar 64 and on the top and bottom walls of these recesses are slotted grooves 66 and 68 which serve as locators and guides for the respective ends of slide pins 48 and 50. Small pockets 70 provide clearance for the rivet heads of rivet pin 52.

In previous hinge constructions, the plate sets 30-32 and 40-42 have been constructed of an equal number of similarly dimensioned plates which support the cantilever load of a hinged door. Over a long period of use, the top and bottom plates have a tendency to wear into the body sections due to the difference in hardness between the steel links and the zinc alloy body sections. In the present construction, the plate sets are formed of three equally dimensioned stamped-out metal plates 72 capped on the top and bottom by plates 74 of half-thickness to make a total dimension of four plates. These capping plates are preferably formed of a durable dense plastic material having a good friction reducing, non-scratch surface such as Nylon reinforced with molybdenum disulphide. This material has a good resistance to water, oil and solvents, and a compressive strength of about 13,000 p.s.i. It can be stamped into shapes identical with the case-hardened metal plates 72 and the shaped plates assembled with the metal plates into the composite and interdigitally arranged plate sets. This places the plastic material in face-to-face contact between the plate sets and also in face contact with the top and bottom surfaces of the block recesses.

The action of the hinge is greatly improved also by the use of plastic bushings of the same Nylon material around slide pins 48 and 50. As shown in FIG. 4, the top and bottom ends of the slide pins are inserted respectively in collars or bushings 80 and 82 which slide in the slots 66 and 68. In addition, a slide block 84 surrounds a central portion of pins 48 and 50 having a flat surface in contact with stationary slide bars 64.

Thus, the metal-to-metal contact has been practically eliminated and yet, due to the hardness of the plastic material and the manner in which it has been inserted, the supporting characteristics of the hinge have not been impaired. The action of the hinging motion is smooth and resistance to motion has been reduced, as well as the need for lubrication. In addition, this has been accomplished without the need for any changes in the outside dimensions of the hinge so that longstanding architectural specifications need not be altered. Another important characteristic lies in the fact that the strength of the hinges has been maintained even though the plastic may not have the resistance to bending found in the steel links.